

Successful Multilevel Replantation Preserves Hand Viability After Transcarpal Crush Avulsion Amputation

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Abstract

Simultaneous transcarpal amputation with loss of multiple digits is an exceptionally rare injury and remains one of the most challenging situations in reconstructive microsurgery, especially when caused by a high-energy crush-avulsion mechanism. We present the case of a 62-year-old right-hand-dominant factory worker who sustained a devastating industrial machine injury to his right hand, resulting in transcarpal amputation, partial palmar avulsion, and traumatic amputation of the thumb, index, middle, and little fingers. The patient reached our center approximately three hours after injury and underwent emergency replantation surgery. Reconstruction was carried out in a stepwise proximal-to-distal fashion, beginning with skeletal stabilization followed by tendon repair, arterial and venous anastomosis, and nerve coaptation at each level of injury. Revascularization of the wrist, palm, thumb, and amputated digits was successfully achieved during a single operation lasting approximately 14.5 hours. All replanted structures showed satisfactory perfusion immediately after surgery. At three weeks of follow-up, limited areas of skin necrosis were noted over the proximal interphalangeal joint of the middle finger and the distal phalanx of the ring finger; however, all major replanted segments remained viable and no principal structure was lost. The patient was discharged on postoperative day 15 with a viable hand and preserved digits. This case highlights that even severe crush-avulsion injuries involving transcarpal amputation and multiple digit loss should not automatically be considered unsuitable for replantation. With timely referral, meticulous microsurgical technique, and an aggressive salvage approach, successful limb preservation and the potential for meaningful functional recovery can still be achieved.

Keywords

Multilevel Replantation, Transcarpal Amputation, Crush-avulsion Injury, Microsurgery, Industrial Trauma, Hand Reconstruction